

DEPARTMENT OF THE ARMY
Fort Detrick
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Biological Labs.

Quarterly Status Report from 1 May 1966 to
1 August 1966 on NASA Contract R-35

During the period four studies were conducted. These were (1) to determine if it requires longer to sterilize microorganisms on mated surfaces than organisms on exposed surfaces, (2) to investigate the feasibility of using a diatomaceous earth-microorganism combination for a standard test procedure to evaluate the effectiveness of dry heat sterilization, (3) to investigate the sporicidal activity of ethylene oxide and methyl bromide gases combined, and (4) to investigate the death rate of microbial spores entrapped in crystals, exposed to ethylene oxide or heat.

Preliminary tests at 125° C indicated that it is no more difficult to kill bacterial spores sandwiched between mated glass or metal surfaces than to kill spores on the freely exposed surfaces of these materials. Nuts and bolts, stainless steel strips and glass slides were used for these experiments.

There exists a need for a standard test procedure to evaluate the effectiveness of dry heat sterilization. Determining the death rate and D values (time to kill 90%) of bacterial spores on a glass or stainless steel surface is not stringent enough for spacecraft sterilization. On the other hand using naturally contaminated soil is too stringent and furthermore the microbial population is too variable. Embedding a bacterial spore in a material from which complete recovery can easily be made is the ideal approach to this problem. Initial studies show that B. subtilis var niger spores dried in small diatomaceous earth pellets gives a good test indicator. The death time of B. subtilis var niger spores in the pellets is about twice as long as that for spores on freely exposed surfaces. The test is quantitative since the pellets easily disintegrate by normal shaking in a dilution blank containing glass beads.

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Studies on the third project to determine the sporicidal activity of ethylene oxide and methyl bromide (1 to 3 weight ratio) show that there is no increase activity of the combined gases over that of the oxide alone. Tests are currently under way to evaluate a 2 to 3 weight ratio of ethylene oxide to methyl bromide as did the Russians in their spacecraft sterilization studies. Judging from the preliminary results there is no reason to expect a synergistic effect with this ratio either.

The fourth project is also in the preliminary stages and will be discussed in detail in a future report.